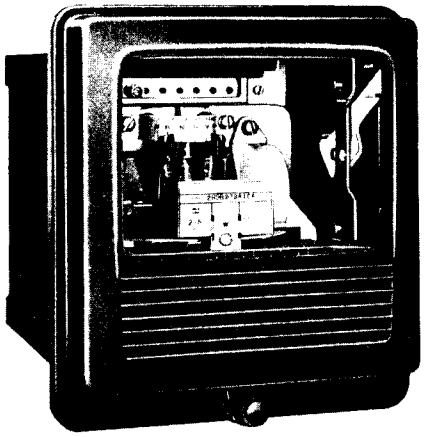
ABB Power T&D Company Inc.
Relay Division
Coral Springs, FL
Allentown, PA

July, 1991
Supersedes DB 41-100B, pages 1-8,
dated October, 1987
Mailed to: E, D, C/41-100A

For Relaying Control Schemes
Device Number: 90

Type COD Current Sensing Relay

Multi-Range Type



Application

The COD current sensing relay is used to initiate switching or control functions upon a change in line current. It is equipped with independently adjustable high current and low current circuit closing contacts, and operates similar to a contact closing ac ammeter with inverse time delay.

The moving contact assumes a position corresponding to the current applied, moving to other relative positions as line current changes occur. As the relay has inverse timing, the greater the change in applied current the faster the moving contact will travel to its new position.

Two COD designs are available: (1) A single range non-tapped unit with calibrated scale marked for specific values of current within the range of the relay, and (2) a multi-range unit equipped with taps and a calibrated scale marked with percentage of tap value current from 80% to 110%.

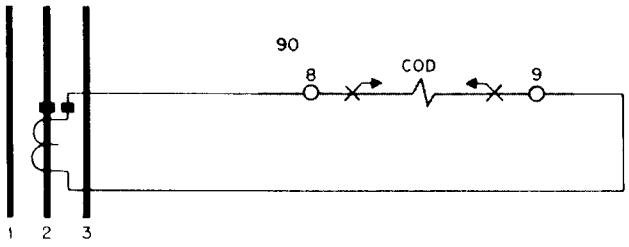
The COD relay unit is commonly used for capacitor switching applications. When the high current contact closes, capacitors are connected to the power line in order to raise line voltage.

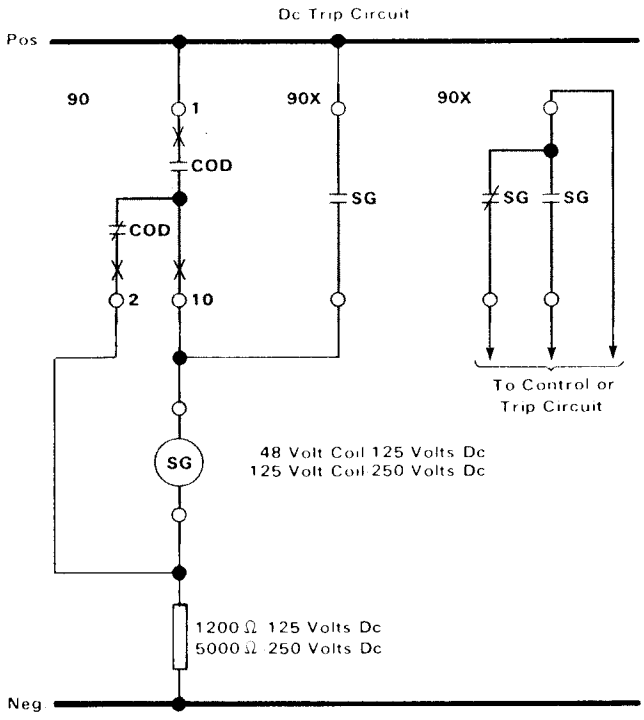
Conversely, when line current drops sufficiently to maintain the low-set COD relay current contact for a preset time, switching is initiated to disconnect capacitors from the power line.

The COD is used in conjunction with time-delay relays to avoid undesired switching due to load current swings.

Auxiliary relays having relatively heavy duty contacts are used with the COD to avoid damage to the COD contacts due to control current interruptions.

Types are also available with Indicating Contactor Switch units in the overcurrent and undercurrent circuits.





Typical Application

The illustrated control scheme utilizes the COD current sensing relay and an SG auxiliary relay. Closing of the high current COD contact energizes the SG auxiliary relay. One contact of the SG seals in around the COD contact, and the remaining SG contacts can be used in the control or trip circuit. The SG will remain energized until the low current COD contact closes and shorts out the coil of the SG.

Device Number Chart
90 -Control Relay, Type COD
90X-Auxiliary Relay, Type SG

Construction and Operation

(1) **Moving Contact**

(2) **Adjustable Contacts**

(3) **Indexed Scale**

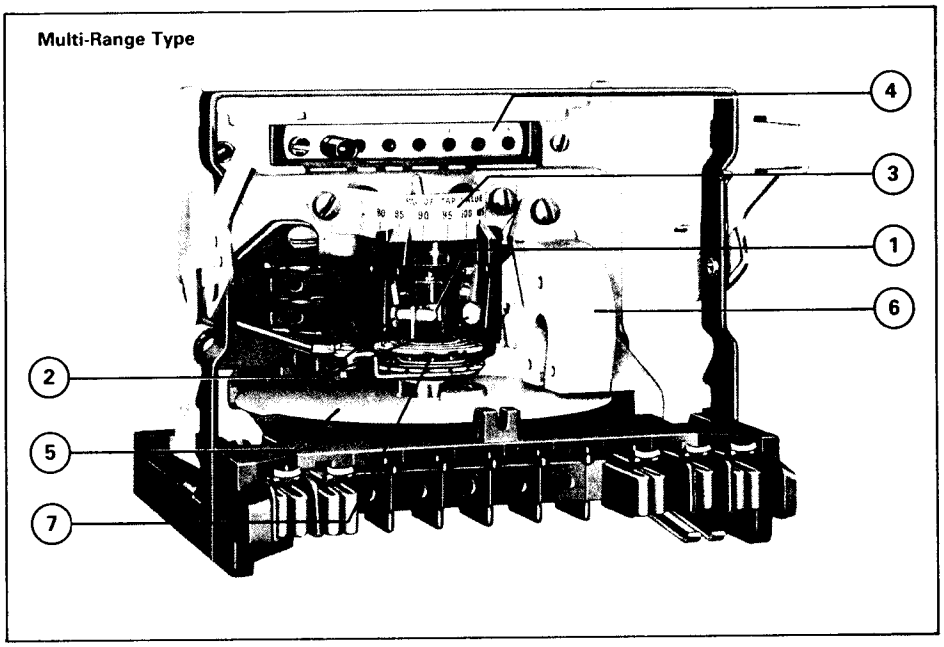
(4) **Tap Block**

Applies to multi-range type only.

(5) **Induction Disc**

(6) **Damping Magnet**

(7) **Spiral Spring Assembly**



Both the single-range and multi-range COD relays consist of an induction disc unit which embodies an "E" type laminated magnetic structure.

The main current coil (either tapped or untapped) is located on the center leg of this magnetic structure. Flux produced by the main current coil returns through the two outer legs of the electromagnet.

A shading coil located on one of the outer legs of the magnetic structure creates an out-of-phase flux which reacts with the main coil flux to cause rotation of the disc in the air gap of the electromagnet.

Rotation of the disc is opposed by a spiral spring on the induction disc shaft which also carries the moving contact. Torque created by the electromagnet is balanced by the opposing torque of the spiral spring, and the disc shaft assembly with the moving contact assumes a position corresponding to the current applied to the electromagnet, unless the travel is limited by the setting of the adjustable contacts.

Disc rotation is damped by the horseshoe shaped magnet.

When the magnitude of applied current is less than the setting of the low current adjustable contact, the moving contact rests against the adjustable contact. Applied current values between the high and low settings will cause the moving contact to float between the high and low adjustable contacts. Current values above the high current setting will cause moving contact to close the high current circuit.

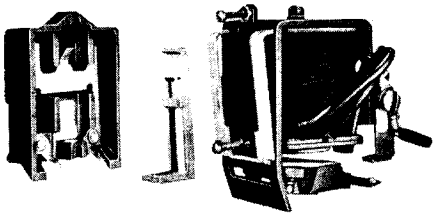
The induction disc unit has inherent inverse time characteristics. A small change in current will cause the disc to move slowly from its original position and a large change in applied current will move the disc at a faster rate.

The adjustable contact settings also have an effect on the speed of response. Consequently, for the same rate of change in current, a close setting of the adjustable contacts will produce faster contact operation than a wide separation, since the moving contact has farther to travel to make contact with a wide separation of the stationary contacts.

As an example, when using the 0.5-2.0 ampere untapped single range relay with the high current contact set at maximum and the low current contact set at minimum (approximately 150° separation), and 2.0 amperes applied to the relay, a sudden reduction in the current to zero will result in the relay taking 14 seconds to close the low current contact circuit. Closer spacing of the adjustable contacts will produce a correspondingly shorter time for the relay to close its contact under the same circumstances.

Indicating Contactor Switch (ICS)

Both single-range and multi-range COD relays are also available with an ICS unit in the overcurrent circuit, and the single range type is also available with an ICS unit in both the overcurrent and undercurrent circuits (see figures 2, 4, and 5). The ICS unit is mounted on a pedestal located on the switch jaw block.



The dc operated Indicating Contactor Switch has a clapper type magnetic armature to which leaf-spring contacts are attached.

When the switch is energized, the moving contacts bridge the stationary contacts, completing the trip circuit. The ICS contacts are connected in parallel with the main relay contacts, and relieve them of carrying heavy trip currents.

During operation, two fingers on the armature deflect a spring which allows an operation indicator target to drop. The target is orange in color and readily visible.

Taps on the front of the unit provide connection for either 0.2 (left) or 2.0 (right) amperes dc pickup operation.

When using a 125 or 250 volt dc auxiliary WL relay, the 0.2 ampere tap is recommended. The 2.0 ampere tap is used on 24 or 48 volt dc circuits.

Internal Wiring (Front View) FT-11 Case

Single-Range

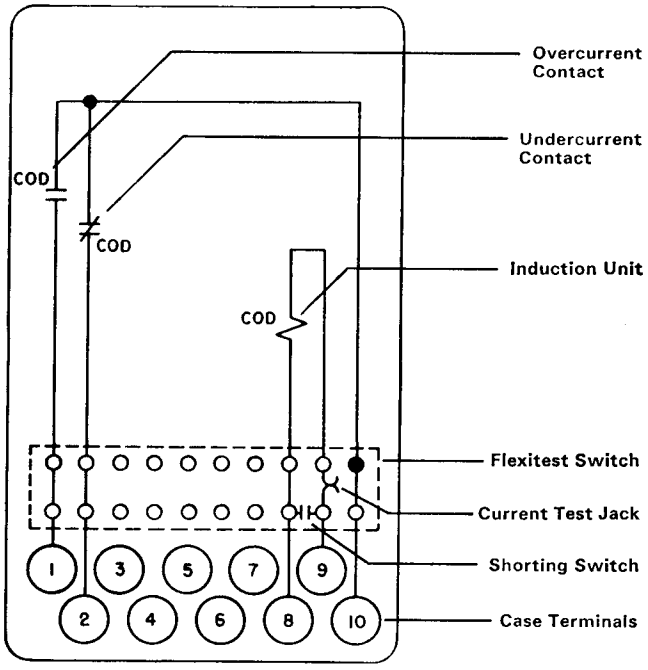


Fig. 1 184A541

Single-Range

With ICS in Overcurrent Circuit

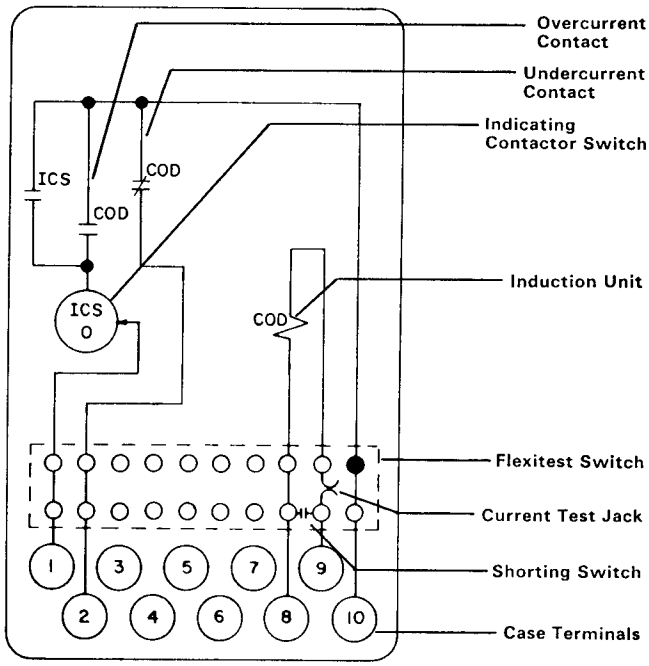


Fig. 2 184A871 Sub. 2

Multi-Range

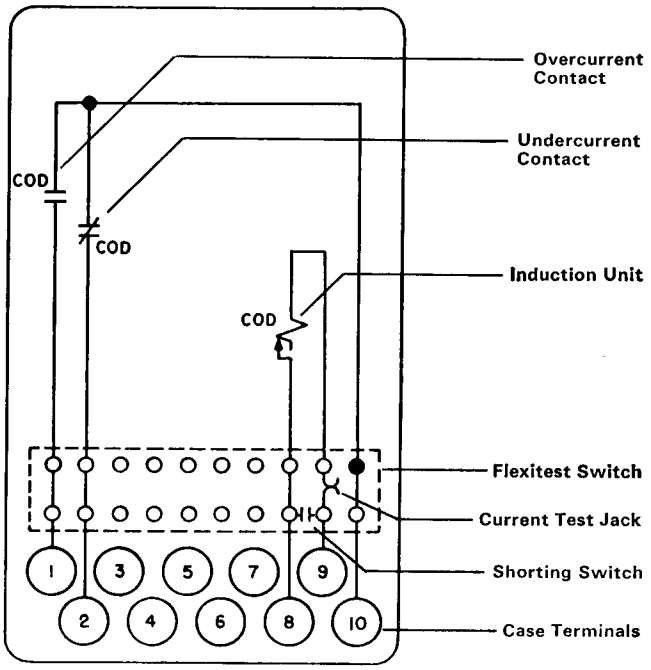


Fig. 3 184A371 Sub. 3

Multi-Range

With ICS in Overcurrent Circuit

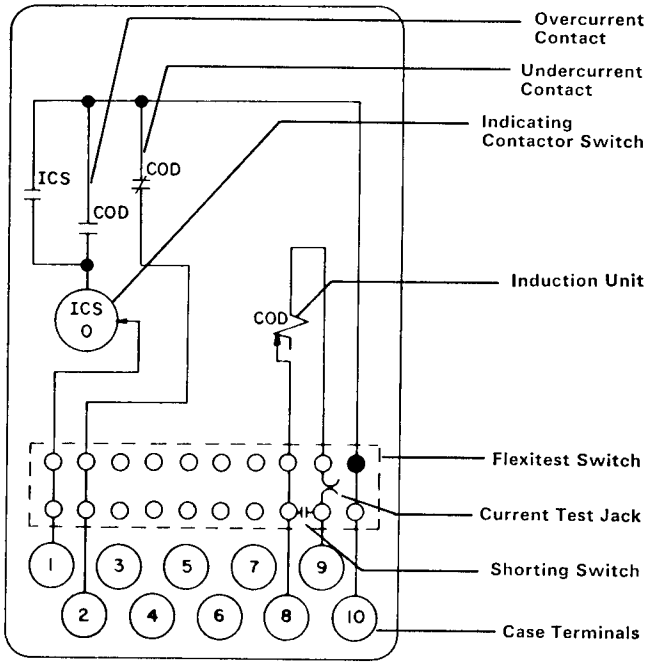


Fig. 4 185A430

Internal Wiring (Front View) FT-11 Case, *Continued*

Single-Range With ICS in Both Overcurrent and Undercurrent Circuits

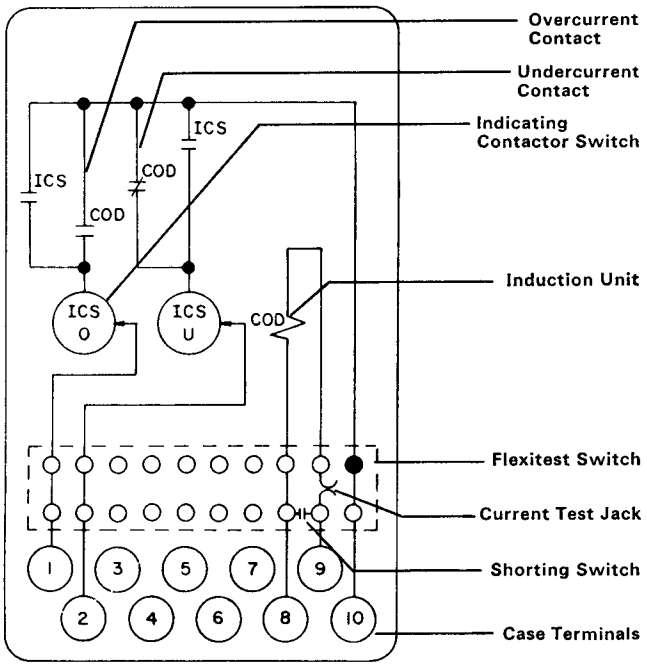


Fig. 5 763A559

Burden Data and Thermal Capacities

Single-Range Type

Ampere Range	Continuous Rating: Amperes	Power Factor Angle (Lag)①	Volt-Ampere Burden		
			At Minimum Setting	At Maximum Setting	At 5 Amps
0.5-2	5	76°	0.48	7.6	42.5
1.5-6	12	74°	0.48	7.6	4.7

Multi-Range Type

Ampere Range:	0.5 to 2.5							2 to 6							4 to 12						
Tap Setting:	0.5	0.6	0.8	1.0	1.5	2.0	2.5	2	2.5	3	3.5	4	5	6	4	5	6	7	8	10	12
Coil Ratings, Amperes — Continuous	2.7	3.1	3.7	4.1	5.7	6.8	7.7	8	8.8	9.7	10.4	11.2	12.5	13.7	16	18.8	19.3	20.8	22.5	25	28
Coil Ratings, Amperes — 1 Second②	88	88	88	88	88	88	88	230	230	230	230	230	230	230	460	460	460	460	460	460	460
Pf Angle, Lag①	72°	71°	69°	67°	62°	57°	53°	70°	66°	64°	62°	60°	58°	56°	68°	63°	60°	57°	54°	48°	45°
VA Burden — @ Tap	2.38	2.38	2.40	2.42	2.51	2.65	2.74	2.38	2.40	2.42	2.48	2.53	2.64	2.75	2.38	2.46	2.54	2.62	2.73	3.00	3.46
VA Burden — 3 x Tap	21	21	21.1	21.2	22	23.5	24.8	21	21.1	21.5	22	22.7	24	25.2	21.3	21.8	22.6	23.6	24.8	27.8	31.4
VA Burden — 10 x Tap	132	134	142	150	170	200	228	136	142	149	157	164	180	198	146	158	172	190	207	248	292
VA Burden — 20 x Tap	350	365	400	440	530	675	800	360	395	430	470	500	580	660	420	480	550	620	700	850	1020

① Degrees current lags voltage at tap value current.

② Thermal capacities for short times other than one second may be calculated on the basis of time being inversely proportional to the square of the current.

Shipping Weights and Carton Dimensions

Relay Type	Flexitest Case Type	Weight: Lbs.		Domestic Shipping Carton Dimensions: Inches
		Net	Shipping	
COD	FT-11	8	11	10 x 10 x 13

Further Information
List Prices: PL 41-020
Technical Data: TD 41-025
Flexitest Case Dimensions (FT-11) DB 41-076
Instructions: IL 41-112
Renewal Parts: RPD 41-916
Other Protective Relays: Application Selector Guide, TD 41-016

Printed in U.S.A.

July, 1991
Supersedes TD 41-020, Type COD on page 10, dated November, 1987
Mailed to: E, D, C/41-100A

For Relaying Control Schemes

Type COD Current Sensing Relay

Over and Undercurrent (Device Number: 90)

Type	Construction	Contacts (adjustable front and back)	Indicating Contactor Switch③	Current Range: Amps Ac Time Unit	**Relay Data** Internal Schematic	Style Number	Case Size
COD①	Without taps		None	.1-.4	184A541	289B979A31	**FT-11**
				.2-.8		289B979A32	
	With taps	Spdt-cc on undercurrent and cc overcurrent		0.5-2.5	184A371	289B979A17	
				2-6		289B979A18	
				4-12		289B979A19	
	Without taps		None	0.5-2	184A541	289B979A29	
				1.5-6		289B979A30	
			0.2/2.0 amp dc ICS in overcurrent circuit	.5-2.0	185A430	1962 735	
				.2-.8		289B979A37	

① 50-Hertz relays and auxiliaries can be supplied at same price. Order "Similar to Style Number ....., except 50 Hertz".

③ ICS: Indicating Contactor Switch (dc current operated) having seal-in contacts and indicating target which are actuated when the ICS coil is energized at or above pickup current setting. Suitable for dc control voltages up to and including 250 volts dc. Two current ranges available:
(1) 0.2/2.0 amps dc, with tapped coil.
(2) 1.0 amp dc, without taps.

Rating of ICS unit used in specific types of relays is shown in price tables. All other ratings must be negotiated.

When ac current is necessary in a control trip circuit, the ICS unit can be replaced by an ACS unit.

The ACS unit may be supplied in place of an ICS unit at no additional cost. Specify system voltage rating on order.